ABSTRACT

A copper bonding pad is directly supported by a copper via pad structure, the copper via pad structure having substantially the same geometry and dimensions as the copper bonding pad. The combination of the copper bonding pad and the copper via pad structure results in an increase in effective thickness of the copper bonding pad. Due to this effective increase in the bonding pad thickness, the bonding pad is more tolerant to the potential dishing problem caused by the CMP process. Additional metal pad structures and via pad structures are used below the bonding pad. The additional metal pad structures and via pad structures comprise alternating segments of interconnect metal and dielectric fillers, and alternating segments of via metal and dielectric fillers, respectively. The alternating segments of interconnect metal and dielectric fillers and the alternating segments of via metal and dielectric fillers prevent or reduce the potential dishing problem that otherwise exists in damascene and CMP processing. The alternating segments of interconnect metal and dielectric fillers and the alternating segments of via metal and dielectric fillers are arranged such that there are a number of columns of solid metal support under the bonding pad. The columns of solid metal support significantly improve the poor mechanical support otherwise provided by the low dielectric constant materials that are presently used in fabrication of modern copper integrated circuits. The columns of solid metal support also improve thermal conductivity of the bonding pad.